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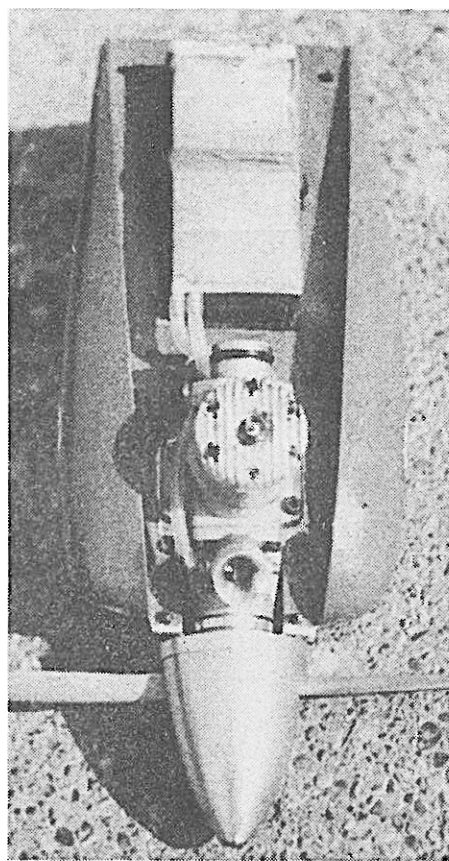
by Hal deBolt

At this time there is an apparent decline in interest in Formula I racing. This is hard to believe if you have been involved in the event. For those who have taken the time to become involved in Formula I, it has to be the most interesting and exciting event in all of modeling. Personally, over the years I have tried all the events with more or less success. There just is no other event which offers so much to the serious R/Cer. The model is "semi-scale" and must be patterned after some of the most interesting full scale machines in the world! There is a great variety to choose from and it is awfully nice to be able to go from one to another and have something different that still is competitive.

Sure, you must have a "racing engine," what could be greater than owning one of the finest and most powerful engines in the world? What could be better than having a fine precision machine which is truly a marvel of this age? Better yet, these fine engines are now available to everyone at a reasonable cost. To the advantage of the average modeler, the engines come ready to race, you do not have to be a machinist to make them competitive; in fact alterations are not allowed by the event rules. Furthermore, if you have no engine knowledge, for a very few dollars, one of several "engine experts" will check your engine, be sure that it is properly set up and even tell you how to get the most from it. Most of today's big winners follow this procedure. Unlike other "speed" events, you do not have to be an engine expert to be competitive.

If you have any interest in experimenting to see if you personally can make a plane go faster, all sorts of propeller alterations are allowed. There is no mystery to this work, no special tools required and any accomplished modeler can rework a prop as well as the other guy. To begin with, there are many fine commercial props available that are most competitive. They do very well without alteration. In fact, most of the reworking amounts to simply altering a commercial prop in some minor way which, hopefully, will add a mile an hour or so.

Finding better ways of using the equipment is of never ending interest. Trying an improved engine mount, seeing how a new glow plug offering compares, perhaps a



Engine power pod. Loosening two screws allows immediate access to engine power department. Everything is seen exactly as it was in flight. Thrust is absorbed by steel dowel locating pins; screws simply hold the pod onto the pins. Both rear rotor and front rotor engines fit the same pod. In this case, needle valve is remote and mounted in the identical location as the rear photo. This allows similar operation.

better needle valve that gives a finer adjustment, experimenting with various fuel systems, a smoother finish for less drag—there is a limitless list of ways to go, things to try—all in hopes of having a better performing racer. If your interest does not go that deep, just using the "standard" setup will keep you competitive.

A good Formula I racer is one of the finest flying R/C models we have. It is extremely easy to handle in the air, is very positive to control action, "grooves" better than any other type and is thrilling to just

"buzz" around the field" with. You very seldom see a bored Formula I pilot! Sure, they fly faster than a sport model. If they didn't, what would make them better? For one thing, they are affected very little by above normal wind conditions, you think nothing of flying a Form I when all other types may be grounded. Fortunately, our human nervous system acclimates itself to speed quickly and easily. After a few laps with a Form I you do not even realize the difference in speed, in fact you soon are wishing for more; especially in a close heat! It could be compared to driving a car on the thruway. You buzz along at 50 mph and everything is great. Increase it to 70 mph and everything seems to be flying by. Stay at 70 for a while and you wish the speed limit was higher as time drags by. It's not much different with R/C models.

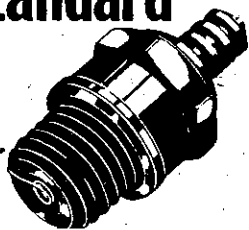
Formula I racing is not just a speed event. The originators and rule makers made sure that would not happen. This foresight has created one of the most equalized competitive events we have in modeling. You can gain an advantage through the handicap system by having a more "scale-like" and/or prettier airplane than others in your race. Of course, if you can go faster than the others your win potential in each heat is greater—after all, this is racing. However, to win a heat you must finish it, all 10 laps. You must also stay outside the pylons; cut them and you are set back. Cut two pylons or pull out of the race before finishing 10 laps, you'd get a zero and, of course, you won't place in the heat.

As you can imagine, it is not at all unusual to see close competitors get a "cut" in a critical heat while trying to gain a little advantage!

You earn points according to your place in each heat. Every heat that you finish adds more or less to your score. No finisher gets zero. The winner of the event and the race is the pilot with the highest score, and very often he is not the fastest contestant. Formula I pays off for consistency as well as speed, both seem equally important if you wish to be number one. The great equalizer is that more often than not, consistency will win out over speed!

In addition, Formula I seems to have attracted some of the finest people in R/C. If you would find pleasure in rubbing elbows with the greatest R/Cers in the world, you will find them in this event. Wonderful

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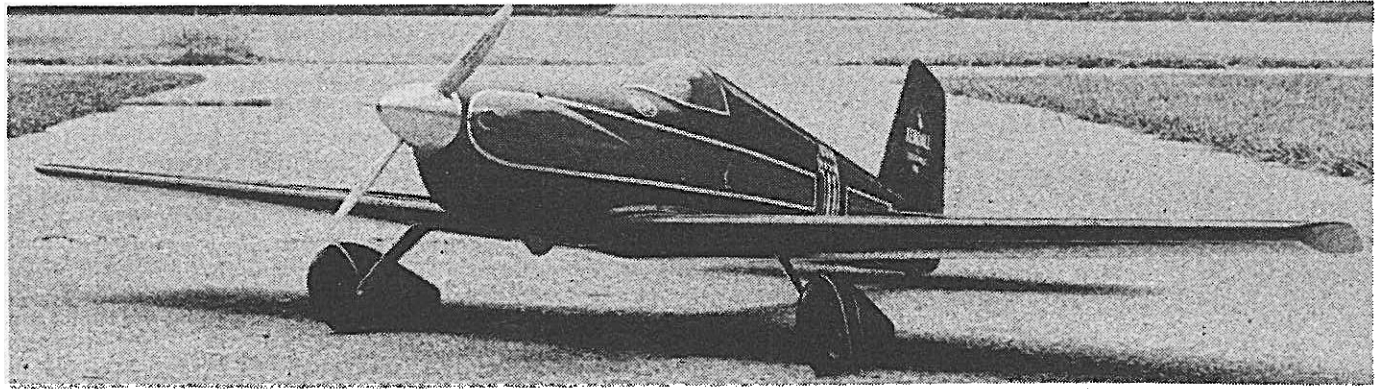
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sportsmen who become appreciated friends, who will make your modeling all the more enjoyable!

If we have whetted your appetite, shown you how you can have even more enjoyment with R/C, give Form I some thought. If there is a racing circuit in your area, check with the leader. He will be most cooperative. If not, take a moment to inquire of your AMA representative, ask at the hobby shop, check at the flying field. Someone will surely guide you in the right direction. Racing people "do it together," join the crowd; you will be most welcome!

NOW LET ME TELL YOU ABOUT THE MIDGET MUSTANG

The "Midget Mustang" presented here is a very time-proven design that should be interesting to the sport flyer who may want to give Formula I a try. Most of the older Form I flyers have found one design that is their favorite and have developed it through a series of "updates." So it has been with my Mustang. Originally, I found the design to have some distinct assets which are very favorable to model use. Formula I models fly very easily, in spite of their speed, actually much better than other types, especially in wind. Their one drawback would be take-offs and landings. This is where the "Mustang" excels, with its well-located and wide-track landing gear, it is far superior in this respect than any other racer. Every time I have bounced one of my other designs about a bit, the urge has always been to go back to the Mustang. More than just think it, many times I have, and each one has incorporated the improvements and added niceties that experience brings. This latest Mark V version features all the latest



The engine used a "pressure cowl" for greater cooling capacity. The wide spread landing gear provides unusual, excellent ground handling.

Formula I racing rules very closely. Lastly, of course, is that it is a very competitive design which has won more races for me than any other (Formula I) I have had.

The fuselage of the model is constructed a bit differently from the average Form I design. The object being to have a longer lasting model (several have made their way through 3 years of hard competition), have more utility, allow quicker inspections and repairs between heats and to gain more efficiency from the engine. The ruggedness of the design comes from constructing the forward portion of the fuselage (where most wear and tear shows up) from plywood. The basic fuselage is simple, two sides separated by bulkheads with fairing on top and bottom. The difference is that the sides are plywood from the trailing edge of the wing forward, with balsa spliced on for the tail section. Using plywood bulkheads between the plywood sides creates a very strong and wear re-

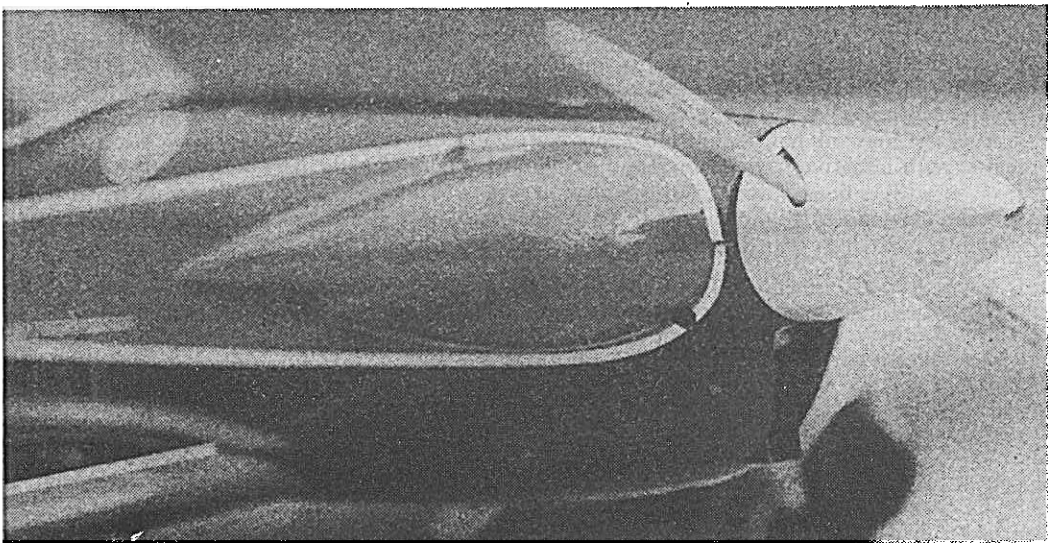
two K&B engines are completely interchangeable, if you do not mind a larger spinner gap with the front rotor engine. For mine, I simply made a modified spinner back plate which filled in this gap without any modifications. One of the ways to go faster, of course, is to gain more efficiency from the engine. The better the engine is cooled the more efficiency it has. Anything which can be incorporated to improve cooling is a plus factor. The Mustang uses what is known as a "pressure cowl." With this type of cowl the air is rammed into the cavity and, by means of baffling, it is held momentarily in the cooling fins, thus heated and exited at a higher velocity than the entering speed. The differential in airflow speed creates a faster than normal flow, thus more air passes the engine with greater cooling results. With the Mustang, such a system is easily created by the internal shaping of the cowl blocks. Over the years that it has been

used, it has proven to be a valuable asset.

What is also obvious is that with the power pod a variety of fuel tanks can be easily used. Not only are they easy to inspect exactly as they are being used, but in turn, different types can be experimented with without resorting to different flying sessions. Versatility is always an asset with any model.

The Mustang wing is exceptionally light, efficient, stable and above all strong. The airfoil used is the NACA 65009 section, which has an excellent lift/drag ratio. This means that the greatest lift is available from the minimum wing area while keeping drag at its lowest possible point. In addition, this series of airfoils are among the most stable available; which means excellent control at all times, including low speed landing approaches.

The structural design is stressed skin, which, while providing simplicity of assembly, is also very light and strong. With



Versatile "power pod" allows quick and simple between heat checks of the entire power department. Interchanging various engines is no problem—front and rear rotor types easily used in the same "power pod."

advances which offer the greatest speed and utility.

First, let's take a look at the full scale machine. Dave Long, of Piper Aircraft Corp., designed and constructed one of the very first full scale Goodyear racers (now known as Formula I). Dave called it the "Pea Shooter"; it proved to be very successful and created a considerable amount of interest. Encouraged by the interest, he continued development of the basic design through several modifications finalizing with the version renamed the "Midget Mustang." This version was so successful that it was put into production in kit form by the Bushby Aircraft Corp. While all this was years ago, its success is exemplified by the appearance of several newly constructed Midget Mustangs at recent full scale air races.

The model presented here is much more of a "scale" design than are most of our model Formula I designs in use today. The reason for this is the hope to get a few more of the cherished handicap points, plus the fact that the basic design was so well done that it leaves little room for improvement, even for model use. As a result you will find few changes except in minor details. You will also find that it fits the intent of our

sistent "box" that is far superior to balsa or plastic.

The use of an inverted engine provides some advantages which are hard to come by with any other configuration. The only disadvantage could be in starting; however no problem has been encountered as the use of the pressure fuel system alleviates flooding.

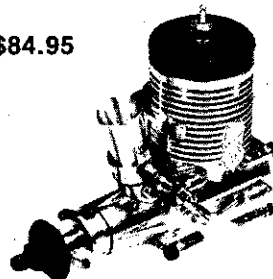
By inverting the engine, two features are possible which time has proven very desirable. First, it is the most practical way to use a so-called "power pod." By using a power pod, the power department, in its entirety, becomes instantly accessible. This can be a valuable asset for inspections and repairs between heats, when time is so valuable. As an example: a fuel tank check, which could take over an hour without the pod, can be done in minutes. A not so obvious advantage is the ability to use various types of engines in the same model, in fact they can be interchanged. With other designs this can be practically impossible. With this Mark V version, both the front rotor and the rear rotor K&B engines can and have been used and interchanged. If a more drastic change in engines was desired, simply constructing a second power pod would be all that was necessary. The



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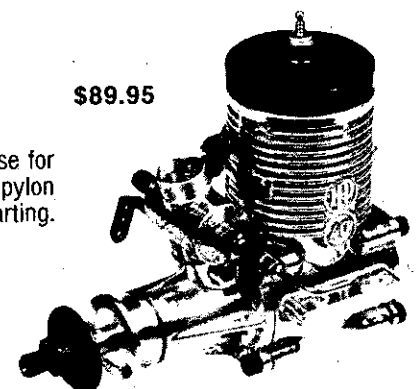
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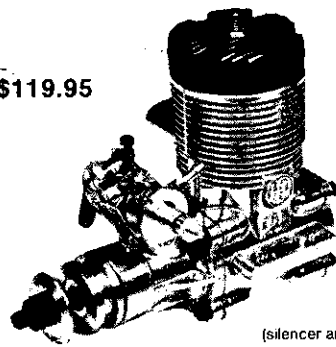
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such a design, the strength comes from the outer skins (required no matter what construction is used) rather than from spars, etc. With the absence of spars and foam, the weight is concentrated where the strength is greatest in any wing, the outer covering or skin.

With the Mustang the landing gear mount is out on the wing, providing wide tread and excellent ground handling. The maple mount is continued in to the center on both panels, thus giving the additional strength desired in the center section. With such a gear mounting the legs can be abnormally short, thus less flexible and very low in drag. A most efficient landing gear design.

The force arrangement used in the Mustang has proven most efficient. The airfoil is symmetrical, requiring a positive angle to create lift. So, the wing is set slightly positive and the tail even more so to bring the lift of both of them into proportion. This means that in level flight the attitude of the fuselage to the airflow will be horizontal, least drag. With the lift of the wing and tail in proportion, as speed changes, they balance each other automatically and no control action is required to maintain level flight. Ease of flight is better with a fast flying model, when the model does as much of the flying as possible, through its built-in stability features. Obviously, the simpler it is to fly a model, the smoother the flight will be and with smoothness comes more speed.

Construction-wise, a racer such as this is obviously not for the novice. However, it is well within the scope and ability of the average sport flyer. Actual assembly is very similar to today's sport models and little instruction is necessary. Some hints could help, however. In assembling the fuselage, it is better to build the power pod first; in any event it will be needed before completion. With the pod assembled you will have the engine and fuel tank in place. Then when the pod is fitted to the fuselage, all the needed fitting clearances are easily accomplished.

The wing goes together quickly by use of a dihedral board and jigs. Simply set up the jigs in position on the board so that the wing can be assembled in an inverted posi-

tion. Butt glue the top sheeting together and cut to outline shape. Then this sheeting can be pressed down into the jigs and held in shape by the ribs and spars. Once this is done, the remainder of the wing can be completed before it is removed from the building board.

If longevity is expected from a Formula I, the foremost consideration must be given to the finish. With a racer you are confronted with high nitro fuels and their devastating effect. Also, vibration is higher and proper treatment can hold this in check.

Experience has created a procedure and materials which can stand this abuse. The most vulnerable area is the nose section of the fuselage. Therefore the nose section and power pod are covered with 3/4 oz. fiberglass cloth back to the trailing edge of the wing. The cloth is applied with polyester resin (only 100% nitro-proof substance yet seen); a second coat is used to fill the pores. The inside of the nose section and pod are also finished with polyester to provide complete fuel proofing. This material also has some binding qualities and tends to reinforce all glue joints against vibration.

The remainder of the fuselage and tail are covered with silkspan paper to help keep the balsa from splitting grain-wise and to cover the pores, thus requiring less filler.

The wing uses stressed skin for its strength. Anything added to this skin improves the strength. It is just as important to cover it as it is the fuselage, so a material is used which will add strength. The wing is covered either with silk or sillon, both of which, when bound to the balsa by dope, make a very light, yet strong laminate.

The lazy way to get an excellent finish (required to obtain the desired handicap points in Formula I) is to use the poxy paints. In turn, of course, they enhance the fuel proofing. The procedure is relatively quick and simple.

After the covering has been applied and sealed with adhesive, the entire frame is sprayed with a heavy coat of SuperPoxxy primer. The primer is sanded smooth and normally will have filled all the pores. Then one good coat of the base color is

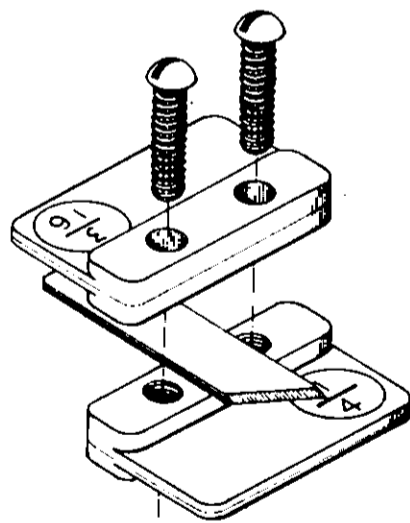
sprayed on; coverage should be complete. If needed, this can be lightly sanded to remove any imperfections. Trim colors are now added; masking is done with mylar tape and/or plastic electrical tape, which is more flexible. Once the trimming is completed, tape edges are knocked down with #600 sandpaper. Any desired decals are added next. With the paint scheme completed, the whole bit is given a coat of clear poxy. If you are still with it and wish a really super finish, the clear can be sanded and resprayed as much as you like until you have the quality finish to satisfy you and fascinate the judges!

Flying this Midget Mustang should be no problem for any experienced R/C pilot. It is fast, but a few laps around the field will accustom you to that. Otherwise, with a dead engine, the rate of sink is much lower than the high drag sport and pattern designs—more like a glider, so to speak. If too much control movement is used, control response can be sensitive; so it is important to keep movements within the parameters before you fly. It's also important, with things happening quicker, that both engine performance and radio operation be perfect. High performance does not lend itself to glitching radios and stalling engines.

Take-off with the Mustang is nicer than with most other Form I designs. Without any crosswind, neutral rudder gives a straight run, usually no compensation is required. With any cross wind, rudder action is most positive and no problem should be expected.

When landing, the approach should be set up long, expecting the low rate of sink while the speed is being bled off. Application of elevator should continue gradually while keeping the fuselage horizontal. With a decrease in speed, the rate of sink will increase with the objective being to have full up elevator at the moment of touch down. Properly accomplished you will hear "Ooohs and Aahs"! The Midget Mustang can bring you into the exciting world of Formula I racing where every heat is a new ball game; it can make the event easy for you, and with a bit of fortitude, it will make you a winner also. Have fun!

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